

Technical Memorandum

To: Javier Toro Project No: 1720214024

Rosemont Copper Company

Tucson, Arizona

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Tel: (403) 387-1634 **CC:** File

Date: March 25, 2022

Re: Site-Wide Water Balance Memorandum

Rosemont Copper World Project

1.0 Introduction

This technical memorandum prepared by Wood Environment and Infrastructure Solutions, Inc. (Wood) on behalf of Rosemont Copper Company (Rosemont) presents the *Site-Wide Water Balance* (SWWB) for the Rosemont Copper World Project (Project). The memorandum outlines the study approach, provides supporting data, presents the computation assumptions, and discusses results. The SWWB is critical in the design of the Project facilities, including water management components.

1.1 Project Description

Figure 1 shows the Project components, including pits, heap leach facility (HLF), tailings storage facilities (TFSs) (TSF-1 and TSF-2), waste rock facility (WRF) and associated ponds. The Project will use two primary copper (and secondary molybdenum) recovery processes: (1) for sulfide ore, and (2) for oxide ore. Summaries of these processes are described below and are illustrated on Figures 2 and 3, respectively. In summary these two processes include:

- 1. Sulfide ore processing through crushing, milling, flotation and concentrate leaching; thickening of tailings; and depositing fine tailings in two designated tailings storage facilities (TSFs), TSF-1 and TSF-2.
- 2. Oxide ore processing through crushing and agglomeration and run-of-mine ore; heap formation and leaching; and leachate Solvent Extraction (SX) and Electrowinning (EW) processing.

There are six pits; with the mining sequence allowing for the complete backfill of three of the mine pits (Heavy Weight, Copper World, and Broadtop Butte) with waste rock. The sequence of pit operation is described below:

- 1. Peach Pit: Operational from Year 1 through Year 5; remains as an open pit.
- 2. Elgin Pit: Operational from Year 1 through Year 3; remains as an open pit.
- 3. Heavy Weight Pit: Operational from Year 1 through Year 7; backfilled with waste rock.
- 4. Copper World Pit: Operational from Year 2 through Year 8; backfilled with waste rock.
- 5. Broadtop Pit: Operational from Year 3 through Year 10; backfilled with waste rock.

6. Rosemont Pit: Operational from Year 5 through Year 15; remains as an open pit.

Based on the current mine plan, the ore processing throughput is provided in Table 1 and summarized as:

- Sulfide Ore
 - 20,000 tons/day (tpd) in the first year (Year 1)
 - 30,000 tpd from Year 2 through Year 4
 - 60,000 tpd from Year 5 through Year 15
- Oxide Ore
 - 20,000 tpd in the first year
 - 30,000 tpd from Year 2 through Year 4
 - 35,000 tpd in Year 5
 - 45,000 tpd from Year 6 through Year 8
 - 40,000 in Year 9 (Rosemont Communication)

2.0 Approach, Data, And Assumptions

The SWWB considers water consumption, water loss through evaporation and material entrainment, water reclaimed from processing, seepage collection for TSFs, non-contact stormwater, and contact water from mine pits and WRFs. With these considerations, the SWWB is used to predict the volume of water loss and estimates the amount of make-up/fresh water needed for operations. Rosemont currently holds a water right for up to 6,000 acre-feet of groundwater. This water right will be the primary water source for start-up of the operation and make-up (fresh) water during the life of the mine. Discussion of individual processes (i.e., sulfide and oxide ore types) and facility water demands follows:

2.1 Sulfide Ore Processing and Tailings

Figure 2, illustrating the sulfide ore processing flow sheet, shows the water flow across various facilities. The sulfide ore is crushed using sufficient water and then sent through a mill for further size reduction prior to the flotation process. The milled ore is passed to the flotation plant where the metal-rich froth is extracted for further processing. The remaining slurry/tailings are passed through a thickener to extract water and form thickened tailings. Rosemont will also use a concentrate leach circuit in combination with the flotation circuit. The thickened tailings from the sulfide circuit are then conveyed to the TSF where the tailings will be cycloned to separate the sand fraction from the fines. The segregated sand fraction will be used in the construction of the TSF embankment, and the fine tailings are stored to the interior of the TSFs.

TSF-1 and TSF-2 will be developed as the mining operation progresses. Table 2 shows the progression of TSF construction and operation. Construction of the TSF-1 starter dam will begin in Year -2 with tailings deposition beginning in Year 1 and continuing through Year 15. Starter dam construction for TSF-2 is planned to start in Year 10 with tailings deposition beginning in Year 11 and continuing through the end-of-mine life (Year 15).

As the thickened tailings are conveyed to the TSF, the cyclone removes the sand fraction for use in embankment construction and the fine tailings are deposited to form a beach within the TSF. The deposition

will be managed to create a pool in the TSF where water will collect (decant pool). Water from the decant pool will be reclaimed and pumped to the Primary Settling Basin for use as process water.

Table 3 presents the primary data and engineering assumptions for general site conditions for the SWWB. The primary data and assumptions used in the SWWB associated with the sulfide ore processing and tailings are provided in Table 4. Rosemont estimates that the initial water content of ore (pre-crushing) is 3.5 percent (%) (by weight) and will rise to 5% with the addition of water during crushing. The crushing water requirement will be fulfilled partially from process water and fresh water. The water content of thickened tailings is assumed at 31.8%. Sand extracted by cycloning is assumed to be 30% of dry tailings and the loss of water during cycloning is assumed to be 12%. Using the settled dry density and the bulk density of tailings the interstitial water content is calculated as 31.6%.

Based on the assumptions used for the design of TSFs, the tailings embankments occupy 20% of TSFs footprint area. The remaining 80% of the TSFs areas are inclusive of the decant pond area, wet beach area, dry beach area, and the drying beach area which are assumed to be 12%, 20%, 24%, and 24% of the tailings area, respectively. The evaporation factors for the decant pond area, wet beach area, dry beach area, and the drying beach area are assumed to be 0.75, 0.7, 0.05, and 0.5, respectively. These factors are applied to the pan-evaporation values to estimate the evaporation from different TSF areas. For example, in the decant pond area, the 0.75 evaporation factor is applied to the total annual evaporation rate of 91.2 inches, resulting in an annual evaporation rate from the decant area of 68.4 inches. The annual seepage rates from TSF-1 and TSF-2, at the end-of-mine condition are estimated to be 695 gpm and 378 gpm, respectively. About 684 gpm of seepage water from TSF-1 can be collected and reused. Similarly, about 372 gpm of seepage water from TSF-2 can be collected and reused.

2.2 Oxide Ore Processing and Heap Leaching

Figure 3 provides a flow sheet for the oxide ore processing including water flow across various stages (leachate, pregnant solution, and barren (raffinate) solution). Both run-of-mine ore and crushed and agglomerated ore will be placed on the HLP. Run-of-mine ore will be hauled directly the HLP, dumped and spread. Other oxide ore is crushed using sufficient water and then run through the agglomerator prior to placement on the HLP. Agglomeration improves the leaching process by binding up small particles that can inhibit percolation of solution. The agglomerated ore will be conveyed to the HLP where a dilute sulfuric acid solution will be applied to leach the copper from the ore. As the solution percolates through the ore, it is collected in a series of overliner drain pipes or makes contact with the liner, both of which direct the solution to the Pregnant Leach Solution (PLS) Pond. The leachate collected from the heap leach pad drainage system is temporarily stored in the PLS Pond. From the PLS Pond, the pregnant solution is sent to the SX-EW plant. The barren (raffinate) solution, which is the solution after the removal of copper, is sent to the Raffinate Pond. Additional acid is added to the solution in the Raffinate Pond to bring the pH to the required level for leaching. Evaporation losses and other water losses are compensated by adding fresh water as needed. The footprint of the HLP progresses from Year 1 through Year 9, as summarized in Table 2.

The primary data and assumptions used in the SWWB associated with oxide ore processing are provided in Table 5. The initial water content of ore (pre-crushing) is assumed at 3.5% and will rise to 5% after water is added during crushing. Water used during the crushing of ore is from fresh water. The water content of the

agglomerated ore is assumed at 15%. The additional water requirement for agglomeration is fulfilled from freshwater.

2.3 Pits

Figure 4 provides the flow sheet for water associated with the pits. Each pit receives direct precipitation, storm water runoff from the local catchment area and groundwater discharge. For purposes of the site-wide water balance, the combined groundwater yield for Peach Pit, Elgin Pit, Heavy Weight Pit, Copper World Pit and Broadtop Butte Pit is estimated to be 65 gallons per minute (gpm). Rosemont Pit is estimated to have a groundwater yield of 296 gpm. Groundwater inflow to the pits, precipitation, and stormwater runoff into the pits (all but the Rosemont Pit) will be used as make-up water for the processing operations and or dust suppression within the pits. The SWWB takes into account evaporative losses related to water from the pits. The assumed surface area for the pits is 0.5 acres for the five Satellite pits and 15 acres for the Rosemont Pit. Water associated with dewatering of the Rosemont pit will be used for dust suppression within the pit or released to an existing drainage east of the Rosemont Pit. Water collected in the Rosemont pit sump will be used for dust suppression within the pit or for process make-up water.

2.4 Surface Water Management

Surface water management is discussed in more detail in the Site Water Management Plan (Wood, 2022a). A summary of surface water management, as described in the Site Water Management Plan, is to divert and/or capture and release non-contact stormwater runoff. This will be accomplished through a series of diversion channels and stormwater collection galleries to route water around the facilities and release into the existing off-site drainages. Figure 1 presented the surface water management features at final configuration. Further details on the surface water management are provided in the Site Water Management Plan (Wood, 2022a).

2.5 Groundwater Management

Rosemont holds a groundwater right to 6,000 acre-feet that is anticipated as the primary fresh water source for the start-up of operations of the mine and will be the source of make-up/fresh water during operations. The wellfield is located northwest of the Project area. Pit dewatering wells on the west side of the Santa Rita Mountains will also be used for fresh make-up water.

3.0 Water Balance Summary

The SWWB was developed to aid in the design of the processing facilities and development of the Site Water Management Plan. The primary goal is to determine when and if additional water sources are needed to meet the demands of the Project. Rosemont's decision in handling non-contact water or stormwater runoff, is to divert, capture and release as much non-contact stormwater runoff as possible.

Table 6 provides the annual water balance summary. As indicated in Table 6, the Project operations will have a surplus of water during the first four years of operations. Once production in Year 5 increases to 60,000 tons per day of sulfide ore, a water deficit will occur, with the peak water deficit of 1000 gpm occurring in Year 6. Based on the SWWB model, the water deficit will occur during Years 5 through 8. A surplus of water will be realized from Year 9 through the end of mining (Year 15).

4.0 References

Bowman Consulting Group (Bowman), 2022. Copper World Project Baseline and Final Facility Configuration Hydrology Modeling Report, Revision 3. August 18, 2022.

Wood, 2022a. Site Water Management Plan. Copper World Project. June 24, 2022.

Wood, 2022b. Civil and Geotechnical Design Criteria. Copper World Project. August 2022.

Attachments

Figures: Figure 1 – Project Location and Facility Layout

Figure 2 – Sulfide Ore Processing and Tailings Storage Facilities Process Flow Diagram

Figure 3 – Oxide Ore Processing and Heap Leach Facility Process Flow Diagram

Figure 4 – Mine Pits Flow Diagram

Tables: Table 1 – Annual Ore Processing

Table 2 - Tailings and Heap Leach Area Progression

Table 3 – General Data Inputs for Water Balance

Table 4 - Primary Data for Sulfide Ore Processing and Tailings

Table 5 – Primary Data for Oxide Ore Processing and Heap Leaching

Table 6 – Water Balance Summary

ACRONYMS AND ABBREVIATIONS

% Percent

ADEQ Arizona Department of Environmental Quality

APP Aquifer Protection Permit

BADCT Best Available and Demonstrated Control Technologies

EOM End-of-Mine

HLF Heap Leach Facility
HLP Heap Leach Pad
HW Heavy Weight
in/year inches per year
gal/ton gallons per ton
gpm gallons per minute
PLS Pregnant Leach Solution

Project Rosemont Copper World Project
Rosemont Copper Company

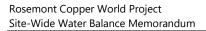
SX-EW Solvent Extraction – Electrowinning

tpd tons per day

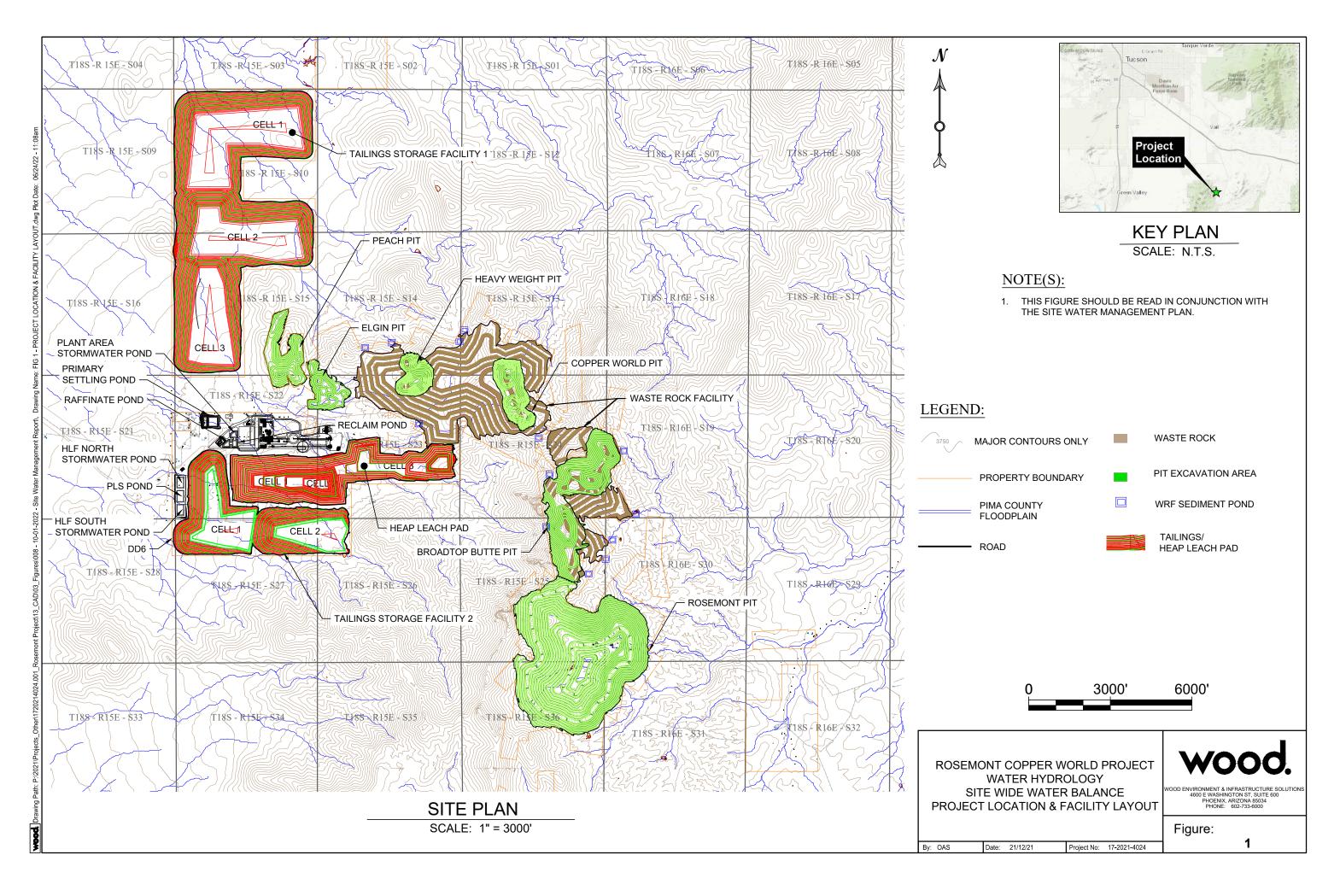
TSF Tailings Storage Facility
TSF-1 Tailings Storage Facility 1
TSF-2 Tailings Storage Facility 2

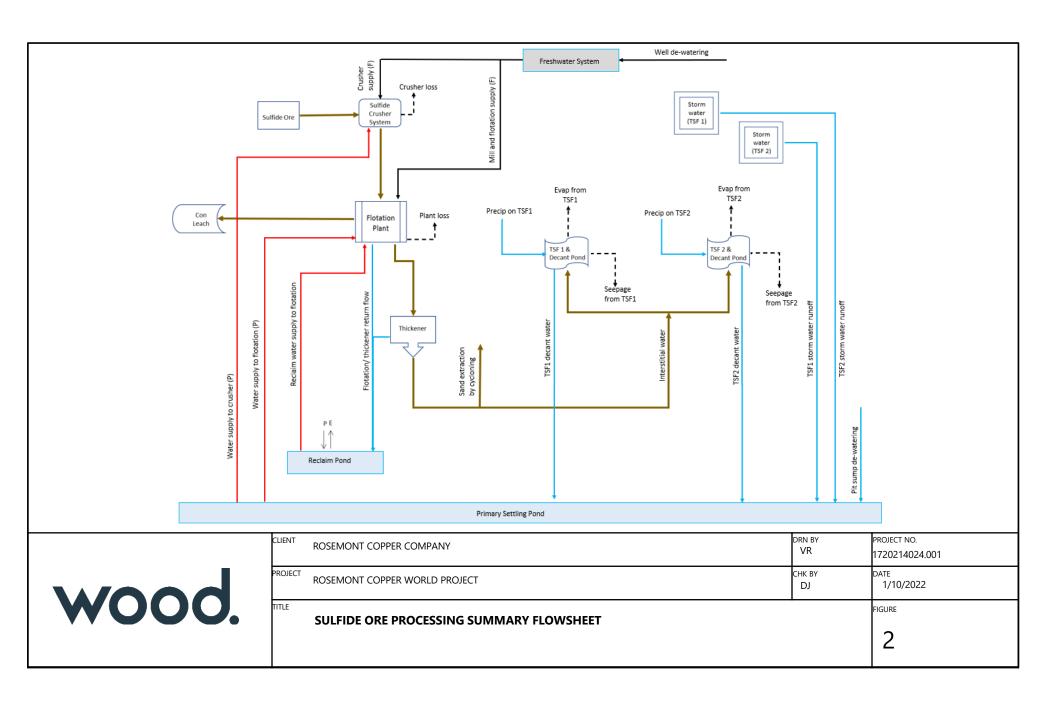
Wood Wood Environment & Infrastructure Solutions, Inc.

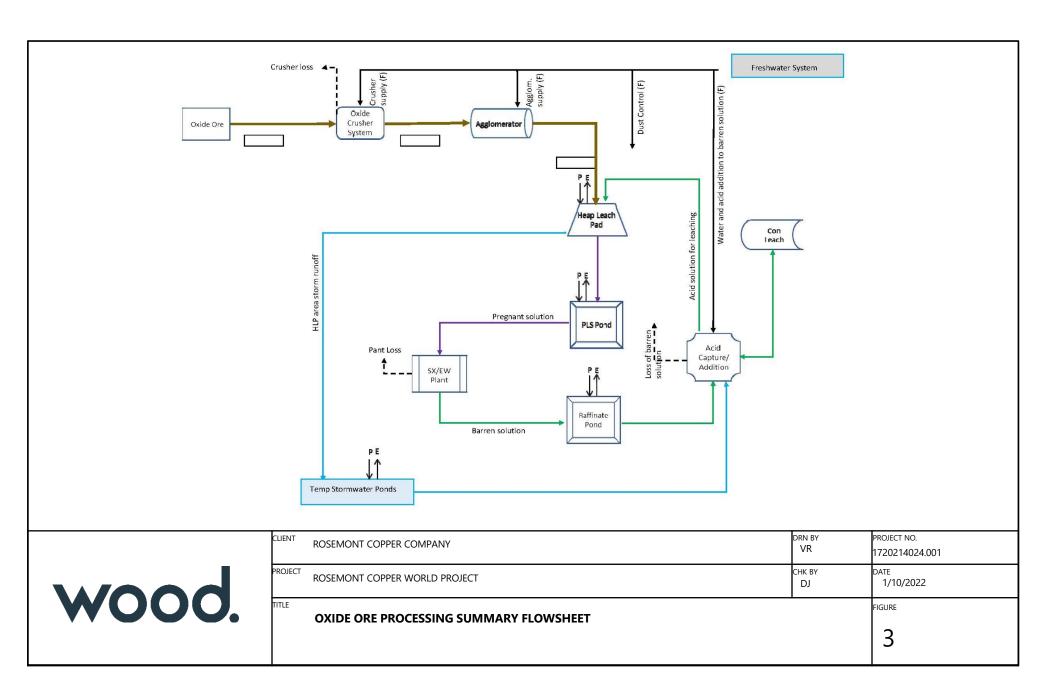
WRF Waste Rock Facility

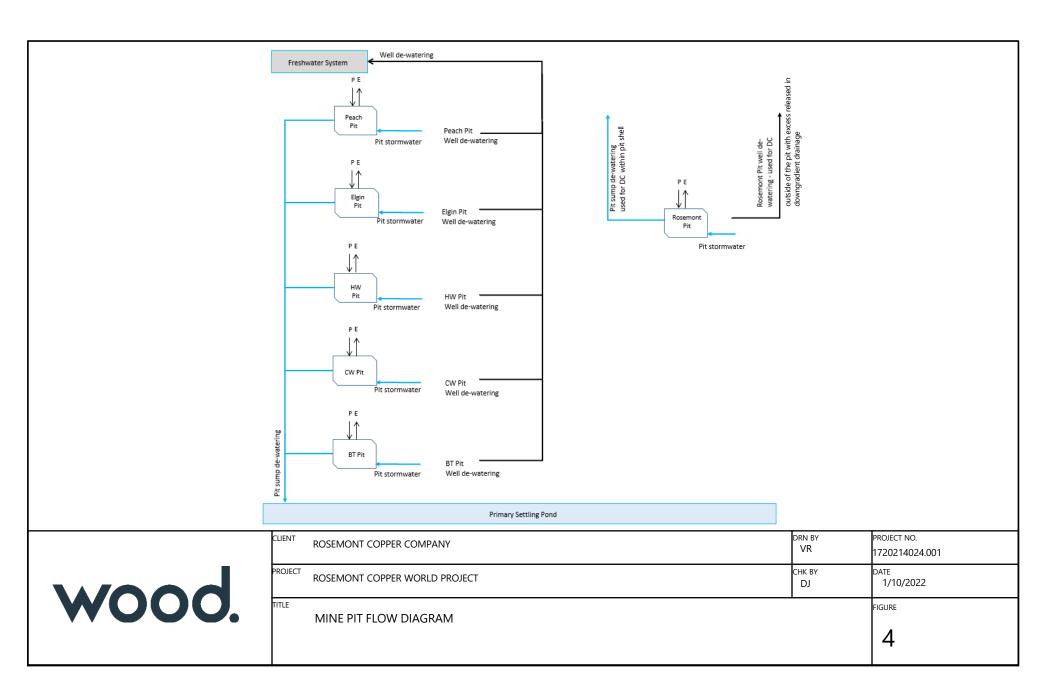


Figures











Tables

Table 1: Annual Ore Processing

Year	Ore Processing Rate (tons/day)										
	Sulfide Ore	Oxide Ore									
1	20,000	20,000									
2	30,000	30,000									
3	30,000	30,000									
4	30,000	30,000									
5	60,000	35,000									
6	60,000	45,000									
7	60,000	45,000									
8	60,000	45,000									
9	60,000	39,208									
10	60,000	0									
11	60,000	0									
12	60,000	0									
13	60,000	0									
14	60,000	0									
15	60,000	0									

tons/day - tons per day

Table 2: Tailings and Heap Leach Area Progression

Year	Į.	Area Covered b	oy Tailings /Heap Leach Fa (acres)	cility
	TSF-1	TSF-2	TSF Total	HLF
1	348		348	100
2	390		390	156
3	431		431	188
4	473		473	218
5	577		577	252
6	622		622	272
7	667		667	272
8	712		712	272
9	757		757	336
10	802	135	938	
11	883	173	1058	
12	883	211	1095	
13	883	249	1133	
14	883	287	1171	
15	946	307	1190	

HLF - Heap Leach Facility

TSF - Tailings Storage Facility

TSF-1 - Tailings Storage Facility 1 TSF-2 - Tailings Storage Facility 2

Table 3: General Data Inputs for Water Balance

	General Data												
	Description	Data	Source										
1	Dust control requirement (gpm)	150	Engineering Estimate for Environmental Losses										
2	Annual Average Pan Evaporation (in)	91.2	Rosemont Design Criteria (Wood, 2022b)										
3	Annual Average Precipitation (in)	19.7	Rosemont Design Criteria (Wood, 2022b)										
4	Estimated Seepage Loss (gpm/ac)	0.86 (TSF-1) 1.22 (TSF-2)	Engineering Estimate										
5	Average Area of Ponds (ac)	4	Based on Initial Designs										

gpm – gallons per minute

in - inches

in/yr – inches/year

ac – acres

Table 4: Primary Data for Sulfide Ore Processing and Tailings

	Data for Sulfide Ore, Mill/Plant and Tailings											
	Description	Data	Source									
1	Ore water content (% by weight)	3.5	Rosemont Design Criteria (Wood, 2022b)									
2	Ore water content after crushing (% by weight)	5	Engineering estimate									
3	Loss to environment at crushing (% by weight)	7	Rosemont Design Criteria (Wood, 2022b)									
4	Fraction of process water supply to crusher (% of total)	85	Engineering estimate for optimal water use									
5	Fraction of fresh water supply to crusher (% of total)	15	Engineering estimate for optimal water use									
6	Total water requirement at flotation plant (g/ton ore)	175	Engineering estimate									
7	Mill/flotation plant fresh water supply (fraction of total water supply, as %)	35	Engineering estimate									
8	Thickened tailings water content (% by weight)	31.8	Engineering estimate /optimized									
9	Sand separated by cycloning (% by weight)	30	Engineering estimate									
10	Loss of water during cycloning (fraction of thickened. tailings water content, as %)	12	Engineering estimate									
11	Settled dry density of fine tailings (lb/ft³)	90	Rosemont Design Criteria (Wood, 2022b)									
12	Specific gravity of fine tailings (dimensionless)	2.65	Primary data									
13	Average saturation (dimensionless)	1	Primary data									
14	Bulk density of fine tailings (lb/ft³)	118	Rosemont Design Criteria (Wood, 2022b)									
15	Interstitial water content (% by weight)	31.6	Calculated from primary data									
16	Embankment area (fraction of footprint, % of total)	20	Based on initial design									
17	Decant pond area (% of tailings area)	12	Based on initial designs									
18	Tailings wet beach area (% of tailings area)	20	Based on initial designs									
19	Tailings dry beach area (% of tailings area)	24	Based on initial designs									
20	Tailings drying beach area (% of tailings area)	24	Based on initial designs									
21	Evaporation factor for pond	0.75	Engineering estimate									
22	Evaporation factor for wet beach area	0.7	Engineering estimate									
23	Evaporation factor for dry beach area	0.05	Engineering estimate									
24	Evaporation factor for drying beach area	0.5	Engineering estimate									
25	Plant site catchment area (ac)	45	Based on initial design									
26	Avg. surface area: PLS Pond, Reclaim Pond, Raffinate Pond (ac)	4	Based on initial design									
27	Avg. surface area: storm ponds (ac)	2.5	Based on initial design									

	Data for Sulfide Ore, Mill/Plant and Tailings										
	Description	Data	Source								
28	Plant site runoff rate (gpm/ac)	0.179	From hydrological analysis (Bowman, 2021)								
29	Undisturbed TSF area runoff rate (gpm/ac)	0.179	From hydrological analysis (Bowman, 2021)								

ac – acres

g/ton – gallons per ton

gpm/ac - gallons per minute per acre

gpm/sf- gallons per minute per square foot lb/ft3 – pound per cubic foot

PLS – Pregnant Leach Solution

Table 5: Primary Data for Oxide Ore Processing and Heap Leaching

	Data for Oxide Ore and Heap Leach Facility												
	Description	Data	Source										
1	Ore water content (% by weight)	3.5	Rosemont design criteria (Wood, 2022)										
2	Ore water content after crushing (% by weight)	5	Engineering estimate										
3	Loss to environment at crushing (% by weight)	7	Rosemont design criteria (Wood, 2022)										
4	Fraction of process water supply to crusher (as %)	80	Engineering estimate for optimal water use										
5	Fraction of fresh water supply to crusher (as %)	20	Engineering estimate for optimal water use										
6	Water content at agglomeration (% by weight)	15	Engineering estimate										
7	Fraction of process water supply to agglomerator (as %)	80	Engineering estimate for optimal water use										
8	Fraction of fresh water supply to agglomerator (as %)	20	Engineering estimate for optimal water use										
9	Undisturbed HLF area runoff rate (gpm/ac)	0.179	From hydrological analysis (Bowman, 2021)										
10	Leaching solution application rate (gpm/sf)	0.004	Rosemont design criteria (Wood, 2022)										
11	Leaching solution application total (gpm)	3000	Rosemont design criteria (Wood, 2022)										
12	Loss of barren solution at SX/EW plant (% by weight)	5	Engineering estimate for optimal water use										
13	Loss of barren solution at Con Leach (% by weight)	2	Engineering estimate for optimal water use										

gpm/ac - gallons per minute per acre gpm/sf- gallons per minute per square foot SX/EW - Solvent Extraction – Electrowinning

Table 6: Water Balance Summary Table

Year	Available Surface Water Runoff from HLP (Footprint)	Available PRC Water from Mill + Plant	Pit Sump Dewatering to PRC Water Pond (After DC Supply - Contact Water)	Total PRC Water Available	PRC Water Supply to HLP	PRC Water Supply to Mill+ Plant	Total PRC Water Supply	PRC Water Deficit	PRC Water Excess	Available Fresh Water from Wells (After DC Supply of Fresh Water)	FRESH Water Supply to HLP	FRESH Water Supply to Mill+ Plant	FRESH Water Supply to DC	Total Fresh Water Supply	Fresh Water Deficit	Fresh Water Excess		Total Make-up Water Requirement		Available Surface Water		Accessible Groundwater		System Water Balance
	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	gpm	Ac-ft/yr	gpm	Ac-ft/yr	gpm	Ac-ft/yr	gpm	Ac-ft/yr
1	33.47	486.12	20.54	540.13	492.57	785.06	1277.63	737.50	0.00	0.00	342.50	894.69	54.90	1292.09	1292.09	0.00	2029.6	3276.0	1116.6	1802.3	3697	5967	2784	4493.5
2	23.45	756.93	44.87	825.25	738.85	1173.04	1911.89	1086.64	0.00	0.00	433.43	1342.03	35.90	1811.36	1811.36	0.00	2898.0	4677.7	396.2	639.4	3678	5937	1176	1898.3
3	17.72	713.89	163.07	894.69	738.85	1173.04	1911.89	1017.21	0.00	0.00	439.16	1342.03	9.90	1791.09	1791.09	0.00	2808.3	4532.9	396.2	639.4	3652	5895	1240	2001.1
4	12.35	669.81	163.07	845.23	738.85	1173.04	1911.89	1066.66	0.00	0.00	444.53	1342.03	9.90	1796.46	1796.46	0.00	2863.1	4621.4	432.5	698.1	3652	5895	1221	1971.3
5	6.27	1505.34	163.07	1674.67	862.00	2336.96	3198.95	1524.28	0.00	0.00	488.21	2684.07	9.90	3182.18	3182.18	0.00	4706.5	7596.8	432.5	698.1	3652	5895	-622	-1004.1
6	2.69	1458.10	163.07	1623.86	1108.28	2336.96	3445.24	1821.38	0.00	0.00	569.12	2684.07	9.90	3263.08	3263.08	0.00	5084.5	8206.9	432.5	698.1	3652	5895	- 1000	-1614.2
7	2.69	1410.87	163.07	1576.62	1108.28	2336.96	3445.24	1868.62	0.00	0.00	569.12	2684.07	9.90	3263.08	3263.08	0.00	5131.7	8283.1	585.9	945.7	3652	5895	-894	-1442.9
8	2.69	1363.63	106.66	1472.98	1108.28	2336.96	3445.24	1972.26	0.00	0.00	569.12	2684.07	44.90	3298.08	3298.08	0.00	5270.3	8506.9	585.9	945.7	3687	5951	-998	-1610.2
9	0.00	1316.40	106.66	1423.06	110.81	2336.96	2447.77	1024.71	0.00	0.00	241.45	2684.07	44.90	2970.42	2970.42	0.00	3995.1	6448.6	667.3	1077.0	3687	5951	359	579.5
10	0.00	1221.57	23.93	1245.50	0.00	2336.96	2336.96	1091.46	0.00	0.00	0.00	2684.07	70.90	2754.97	2754.97	0.00	3846.4	6208.6	667.3	1077.0	3713	5993	534	861.5
11	0.00	1021.28	23.93	1045.21	0.00	2336.96	2336.96	1291.75	0.00	0.00	0.00	2684.07	70.90	2754.97	2754.97	0.00	4046.7	6531.9	667.3	1077.0	3713	5993	333	538.2
12	0.00	1305.15	23.93	1329.08	0.00	2336.96	2336.96	1007.88	0.00	0.00	0.00	2684.07	70.90	2754.97	2754.97	0.00	3762.8	6073.7	667.3	1077.0	3713	5993	617	996.4
13	0.00	1630.67	23.93	1654.59	0.00	2336.96	2336.96	682.37	0.00	0.00	0.00	2684.07	70.90	2754.97	2754.97	0.00	3437.3	5548.2	667.3	1077.0	3713	5993	943	1521.8
14	0.00	1956.18	23.93	1980.11	0.00	2336.96	2336.96	356.85	0.00	0.00	0.00	2684.07	70.90	2754.97	2754.97	0.00	3111.8	5022.8	667.3	1077.0	3713	5993	1268	2047.2
15	0.00	1990.11	23.93	2014.04	0.00	1952.24	1952.24	0.00	61.80	0.00	0.00	2240.48	70.90	2311.38	2311.38	0.00	2311.4	3730.8	667.3	1077.0	3713	5993	2069	3339.2

Ac-ft/yr - acre-feet per year gpm – gallons per minute HLP – Heap Leach Pad

PRC – Process water and/or Contact water

Pima County, Arizona March 25, 2022